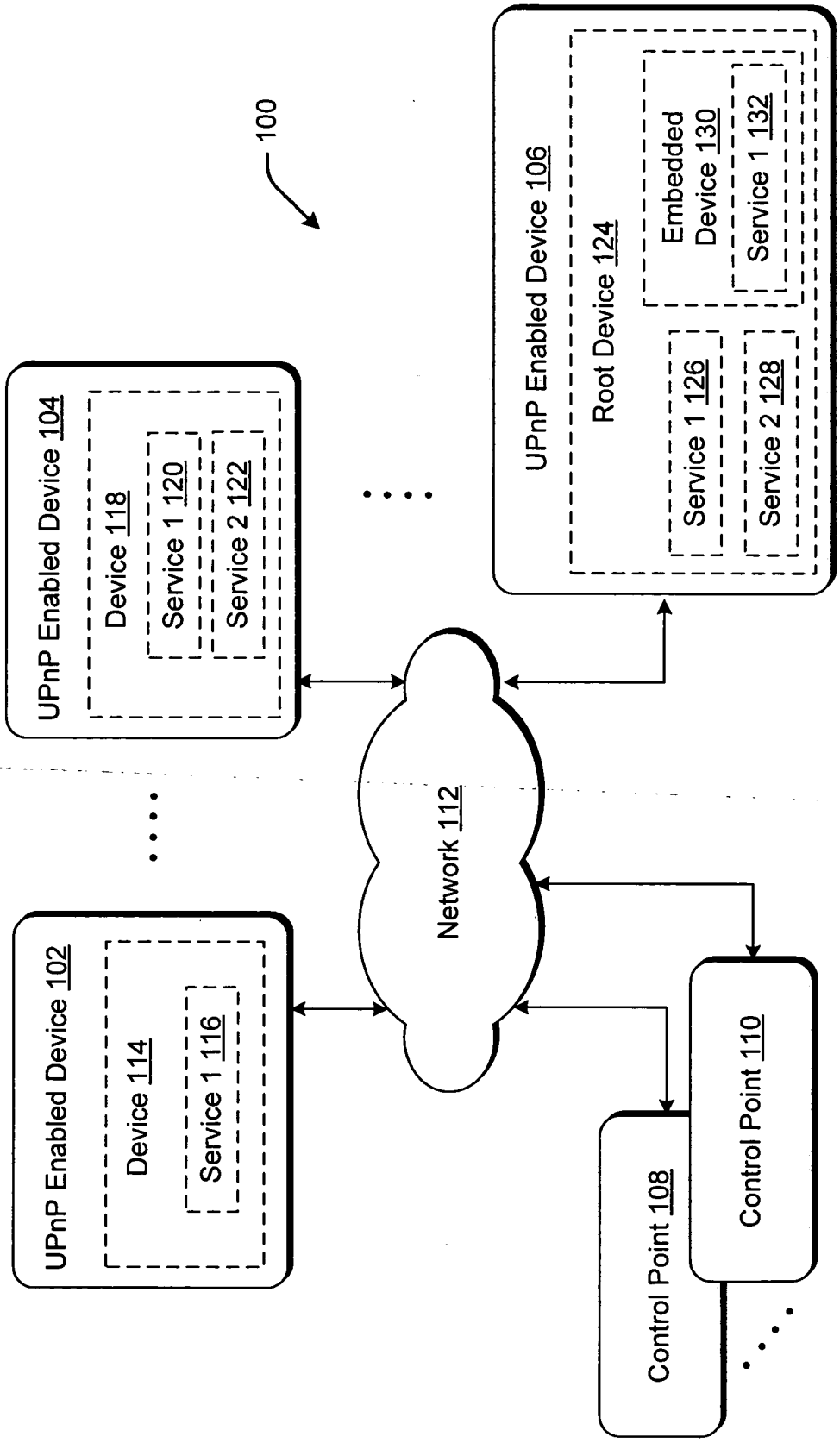
100
UPnP Enabled Device 102
Device 114
Service 1 116
UPnP Enabled Device 104
Device 118
Service 1 120
Service 2 122
UPnP Enabled Device 106
Root Device 124
Service 1 126
Service 2 128
Embedded Device 130
Service 1 132
Network 112
Control Point 108
Control Point 110

Fig. 1

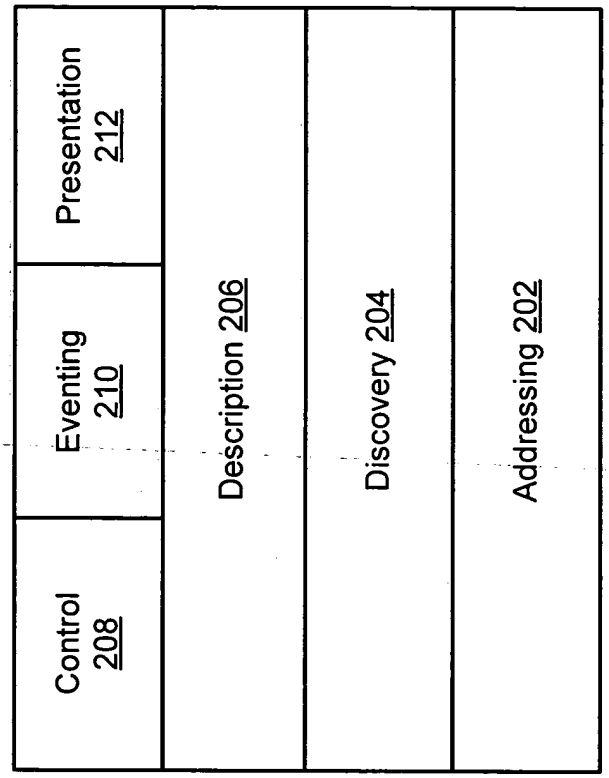
Presentation 212
Eventing 210
Control 208
Description 206
Discovery 204
Addressing 202

Fig. 2

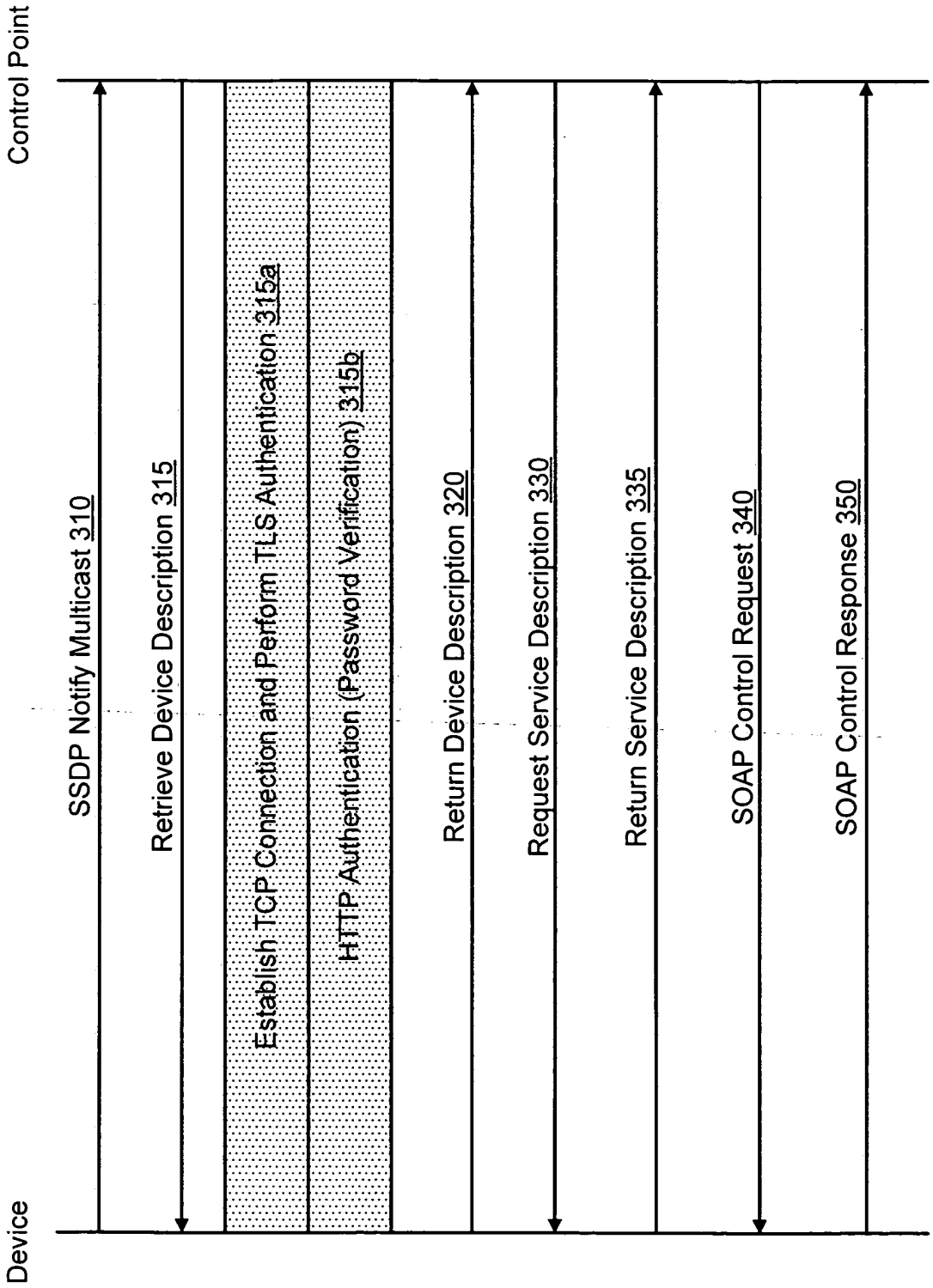
Control Point
Device
SSDP Notify Multicast 310
Retrieve Device Description 315
Establish TCP Connection and Perform TLS Authentication 315a
HTTP Authentication (Password Verification) 315b
Return Device Description 320
Request Service Description 330
Return Service Description 335
SOAP Control Request 340
SOAP Control Response 350

Fig. 3

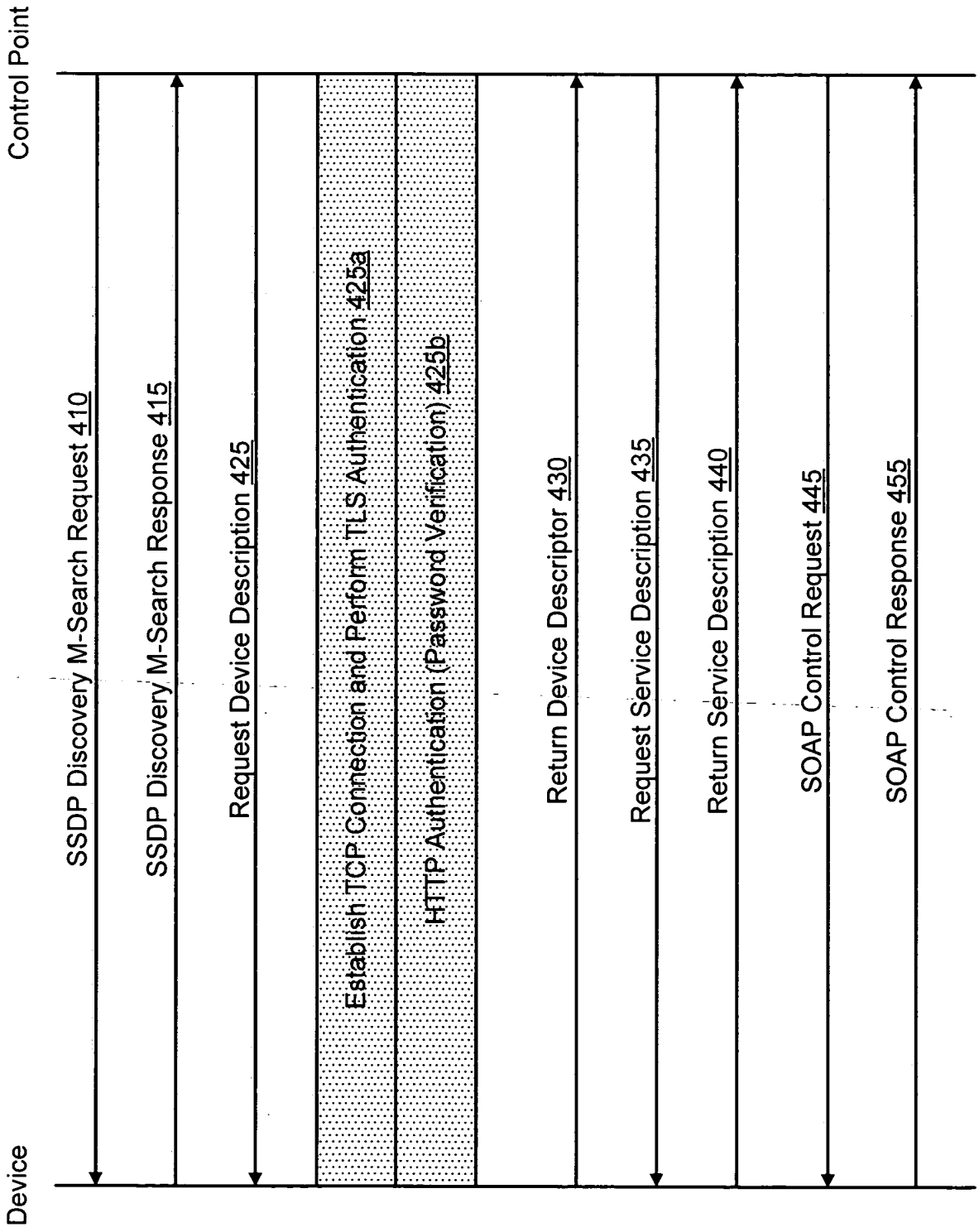
Control Point
Device
SSDP Discovery M-Search Request 410
SSDP Discovery M-Search Response 415
Request Device Description 425
Establish TCP Connection and Perform TLS Authentication 425a
HTTP Authentication (Password Verification) 425b
Return Device Descriptor 430
Request Service Description 435
Return Service Description 440
SOAP Control Request 445
SOAP Control Response 455

Fig. 4

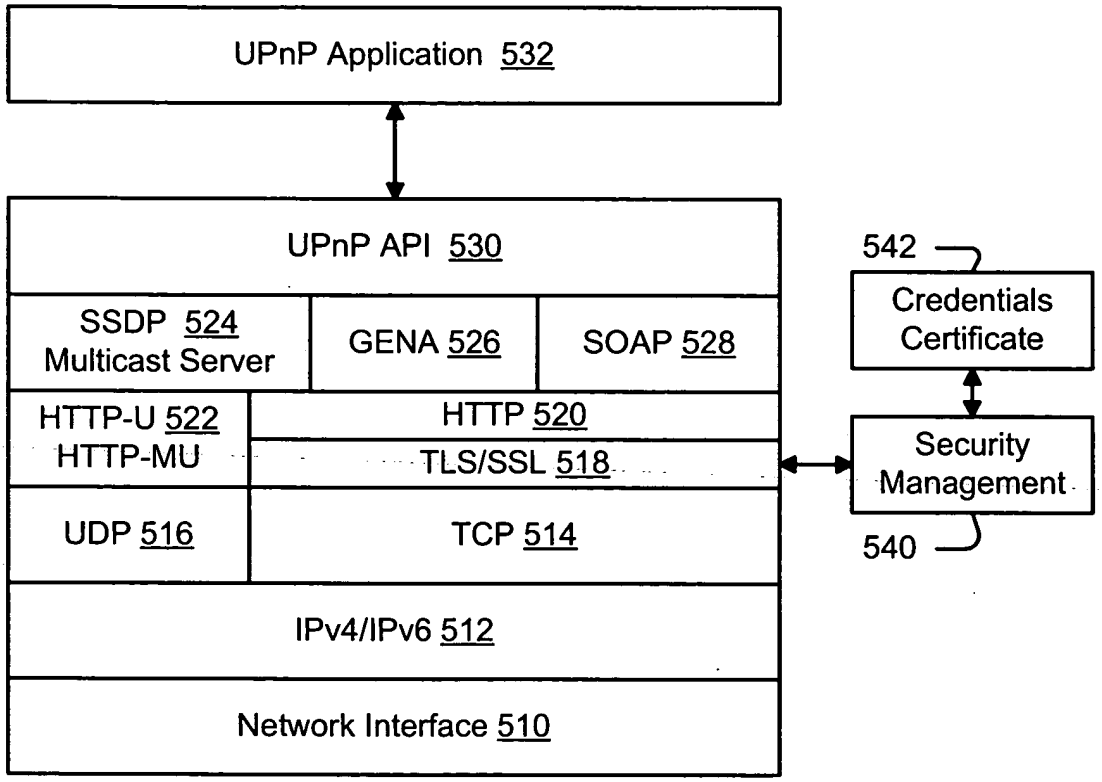
UPnP Application 532
UPnP API 530
SSDP 524
Multicast Server
GENA 526
SOAP 528
HTTP-U 522
HTTP-MU
HTTP 520
TLS/SSL 518
UDP 516
TCP 514
IPv4/IPv6 512
Network Interface 510
542
Credentials
Certificate
Security
Management
540

Fig. 5

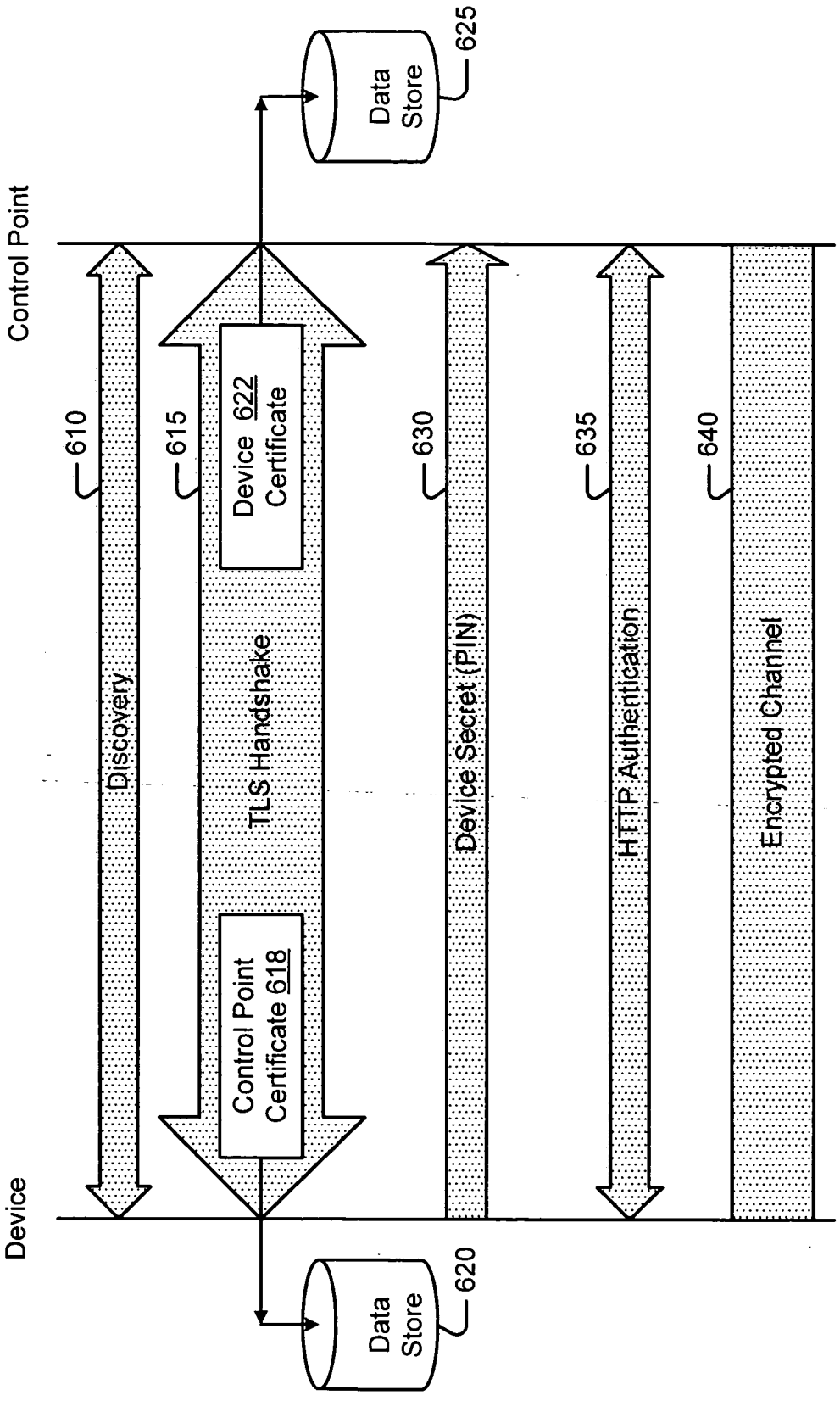
Control Point
Device
Data Store
625
Data Store
620
610
615
630
635
640
Discovery
TLS Handshake
Device Secret (PIN)
HTTP Authentication
Encrypted Channel
Device 622 Certificate
Control Point Certificate 618

Fig. 6

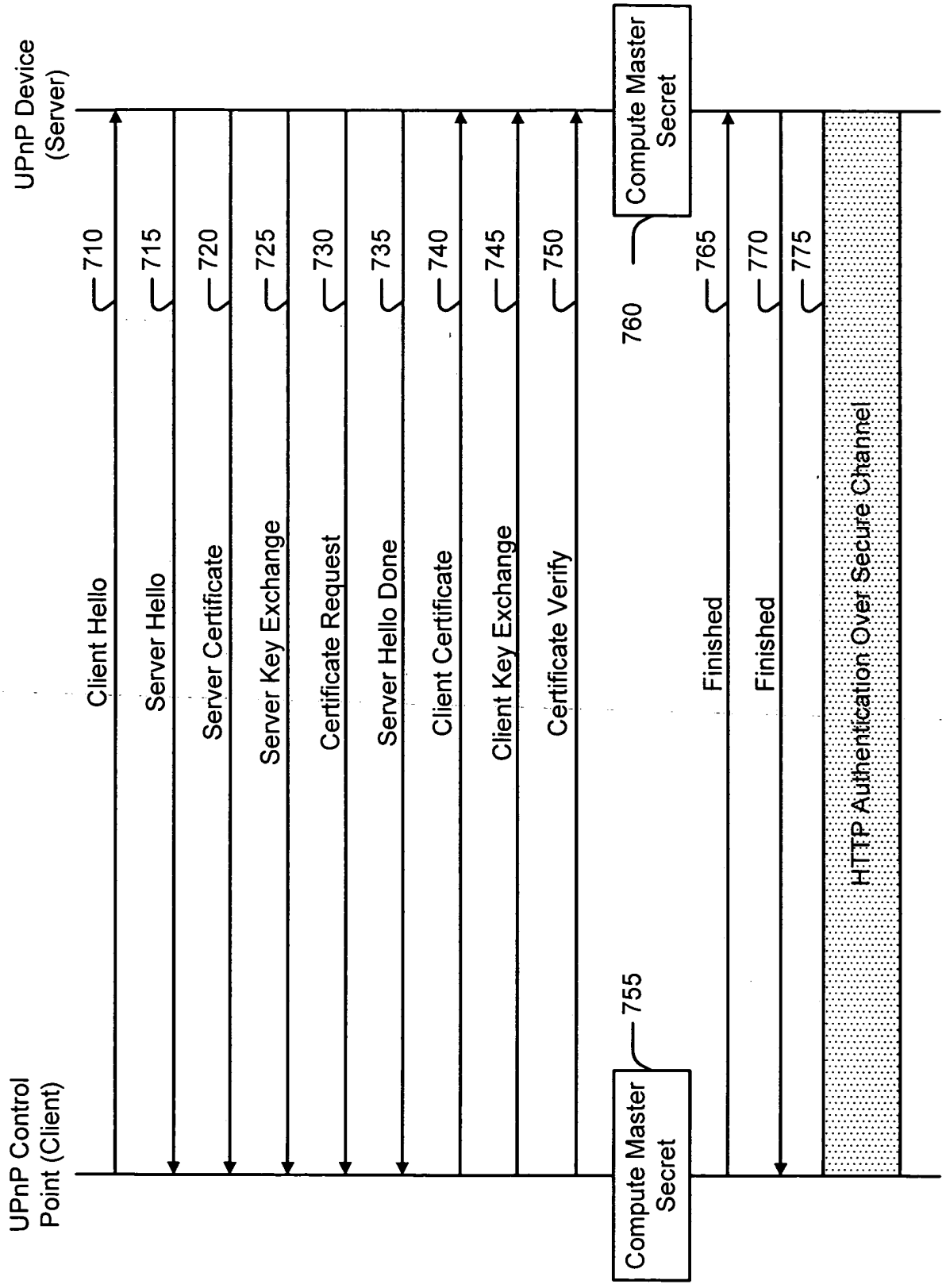
UPnP Control Point (Client)
UPnP Device (Server)
Client Hello
710
Server Hello
715
Server Certificate
720
Server Key Exchange
725
Certificate Request
730
Server Hello Done
735
Client Certificate
740
Client Key Exchange
745
Certificate Verify
750
Compute Master Secret
755
Compute Master Secret
760
Finished
765
Finished
770
775
HTTP Authentication Over Secure Channel

Fig. 7

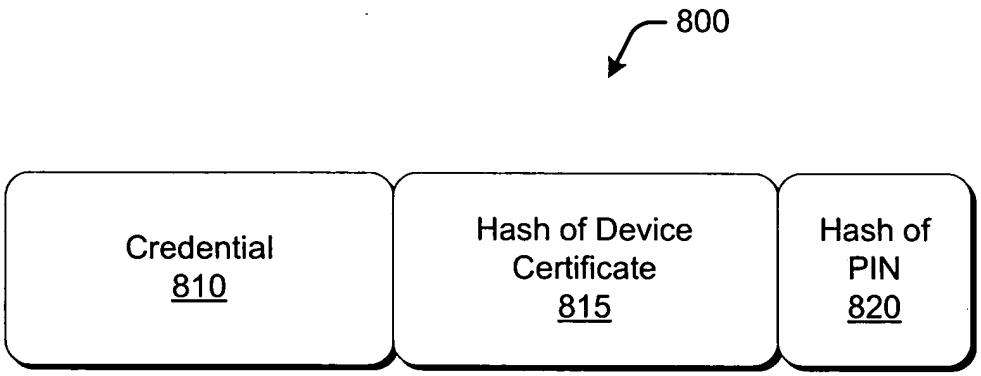
800
Credential
810
Hash of Device
Certificate
815
Hash of
PIN
820

Fig. 8

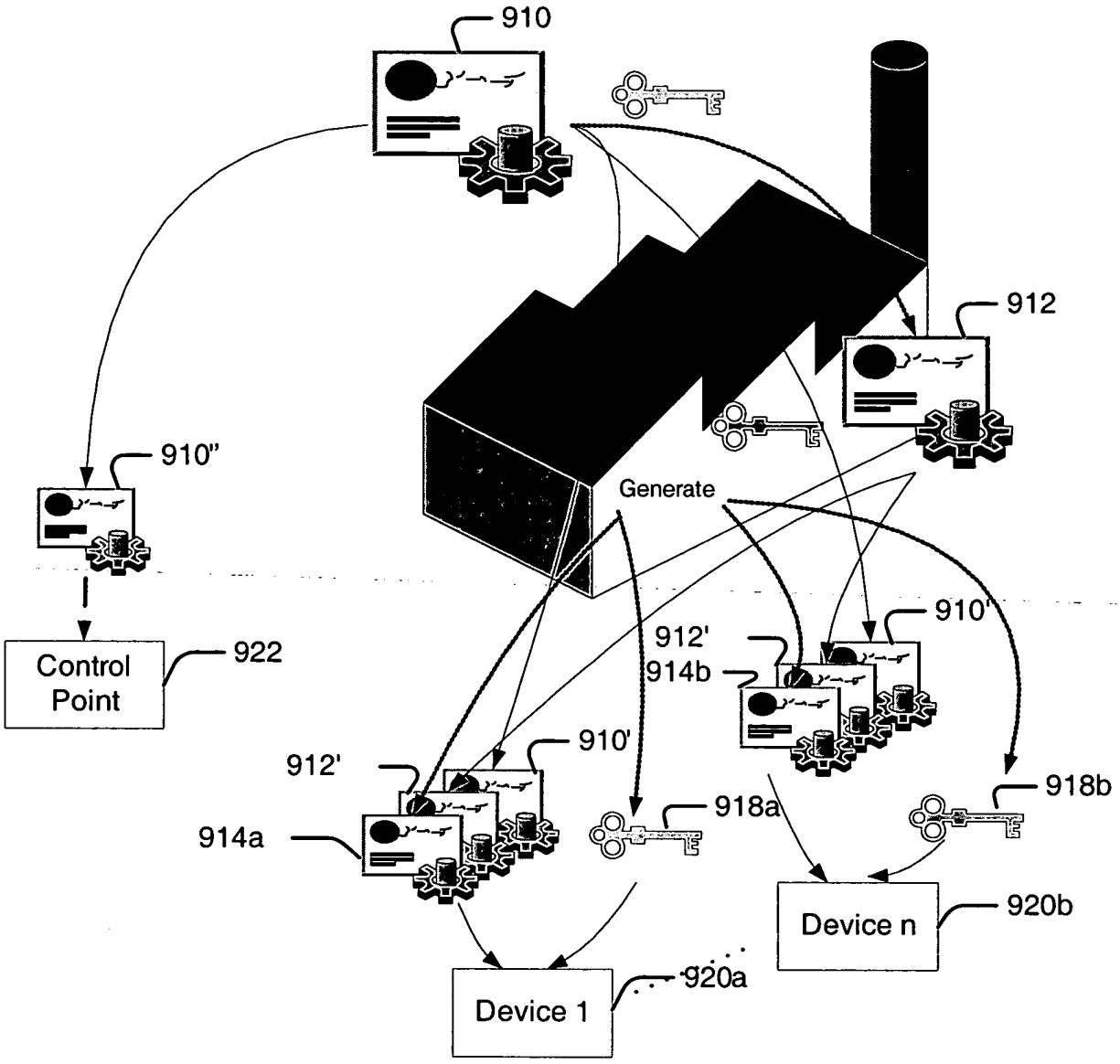
910
912
910"
Generate
Control Point
922
912'
914b
910'
912'
910'
914a
918a
918b
Device n
920b
Device 1
920a

Fig. 9

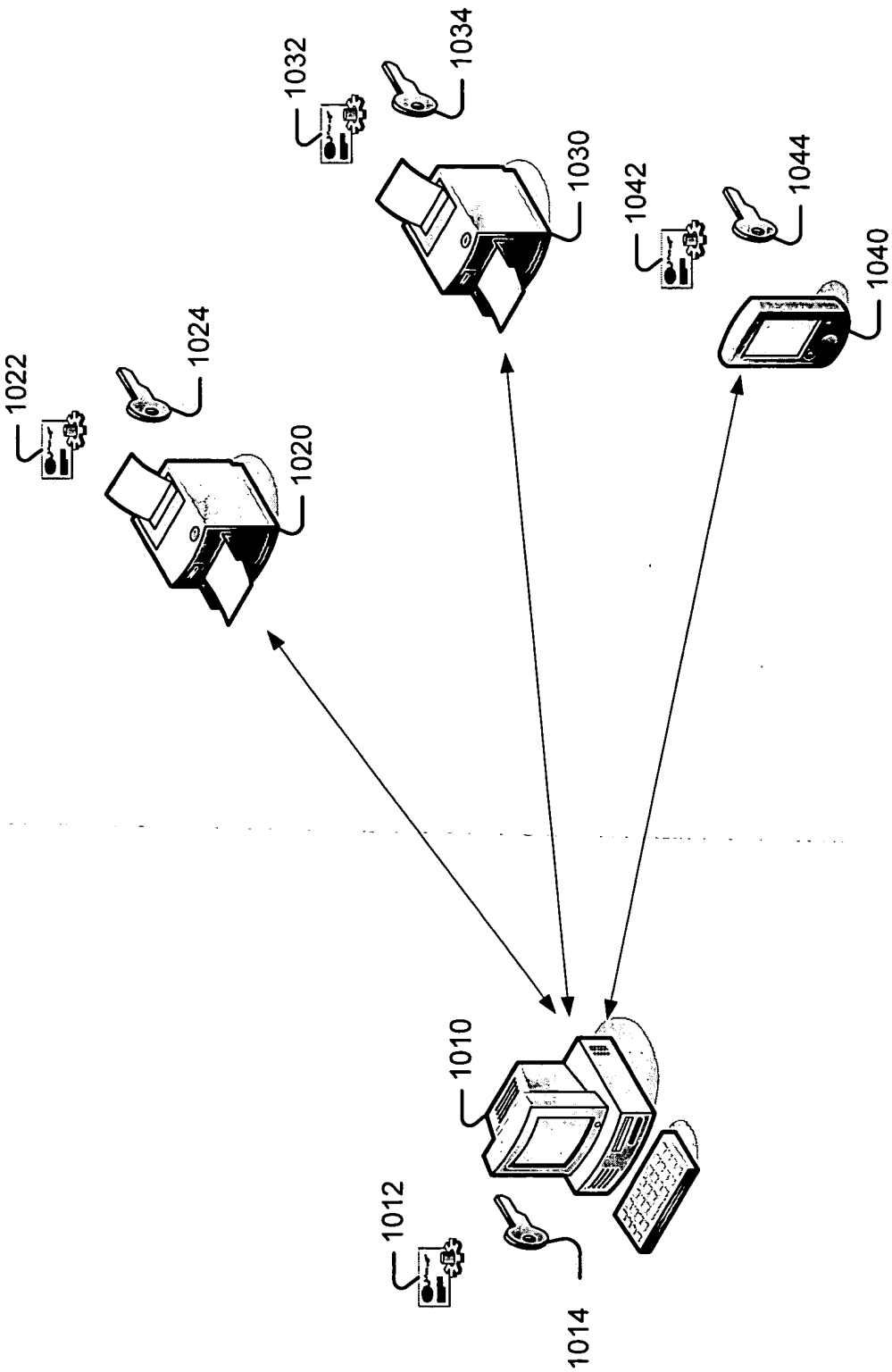

Fig. 10

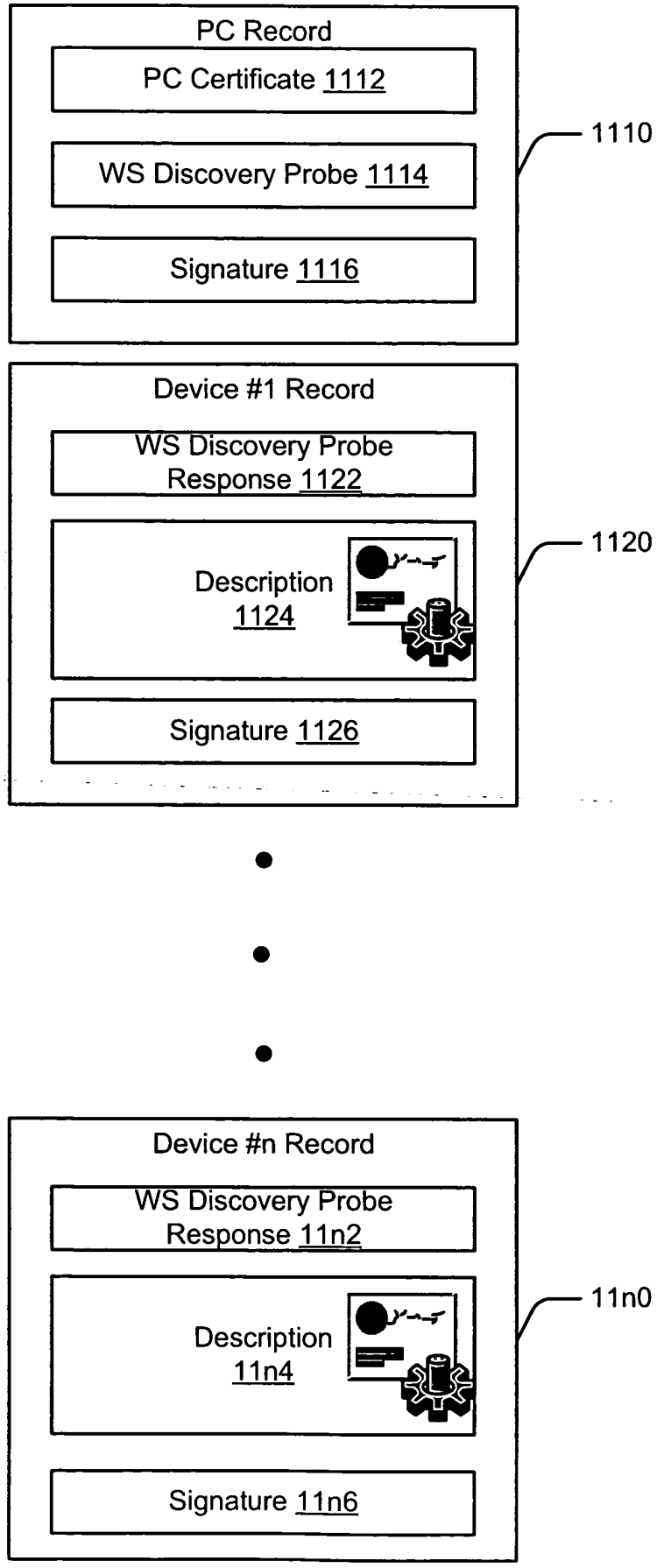
PC Record
PC Certificate 1112
WS Discovery Probe 1114
Signature 1116
1110
Device #1 Record
WS Discovery Probe Response 1122
Description 1124
Signature 1126
1120
Device #n Record
WS Discovery Probe Response 11n2
Description 11n4
Signature 11n6
11n0

Fig. 11

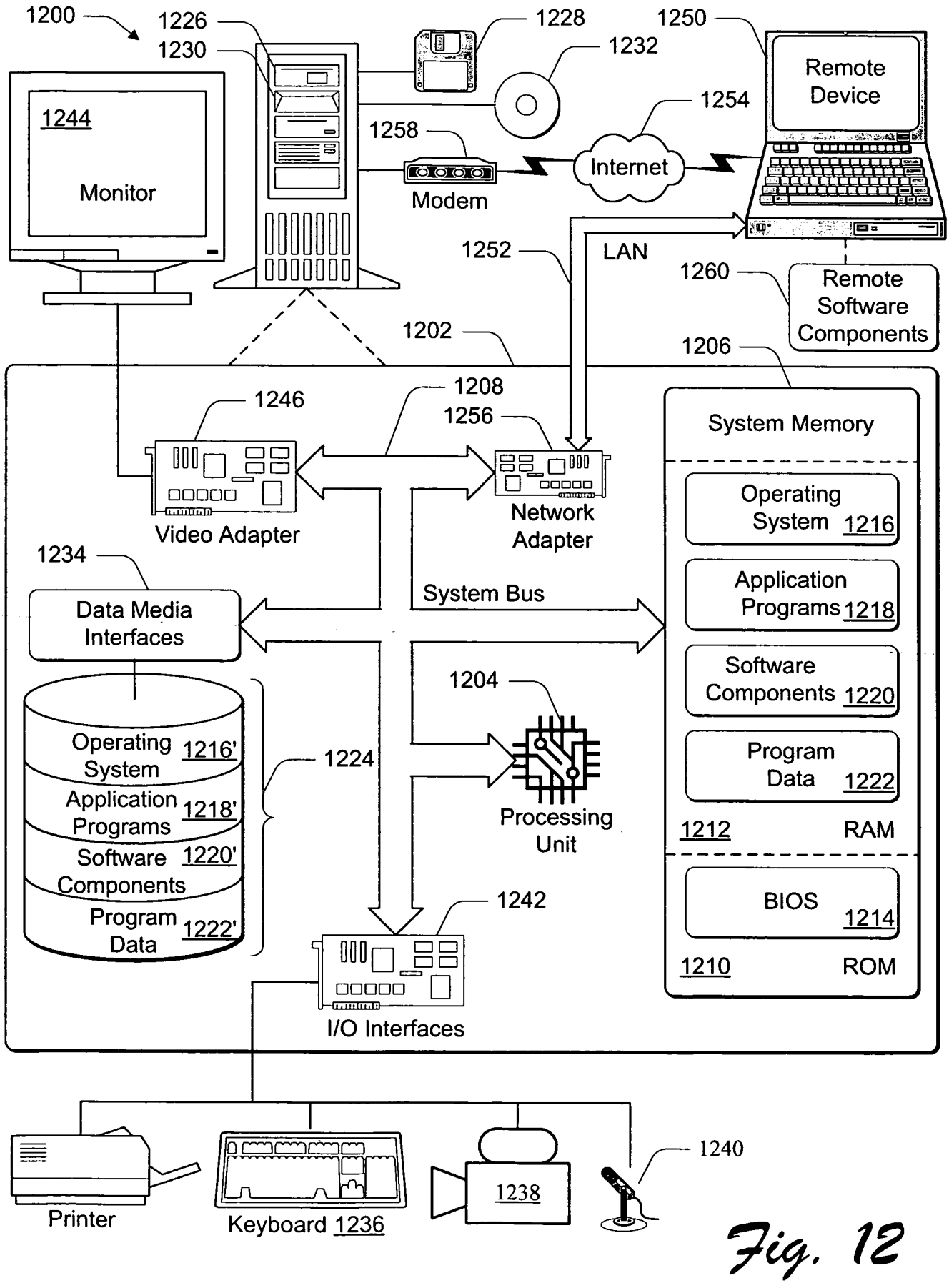
1200
1226
1230
1228
1232
1250
Remote Device
1254
1244
Monitor
1258
Modem
Internet
1252
LAN
1260
Remote Software Components
1202
1206
1208
1246
1256
System Memory
Operating System 1216
Application Programs 1218
Software Components 1220
Program Data 1222
1212 RAM
BIOS 1214
1210 ROM
Video Adapter
Network Adapter
1234
Data Media Interfaces
System Bus
1204
Operating System 1216'
Application Programs 1218'
Software Components 1220'
Program Data 1222'
1224
Processing Unit
1242
I/O Interfaces
Printer
Keyboard 1236
1238
1240

Fig. 12

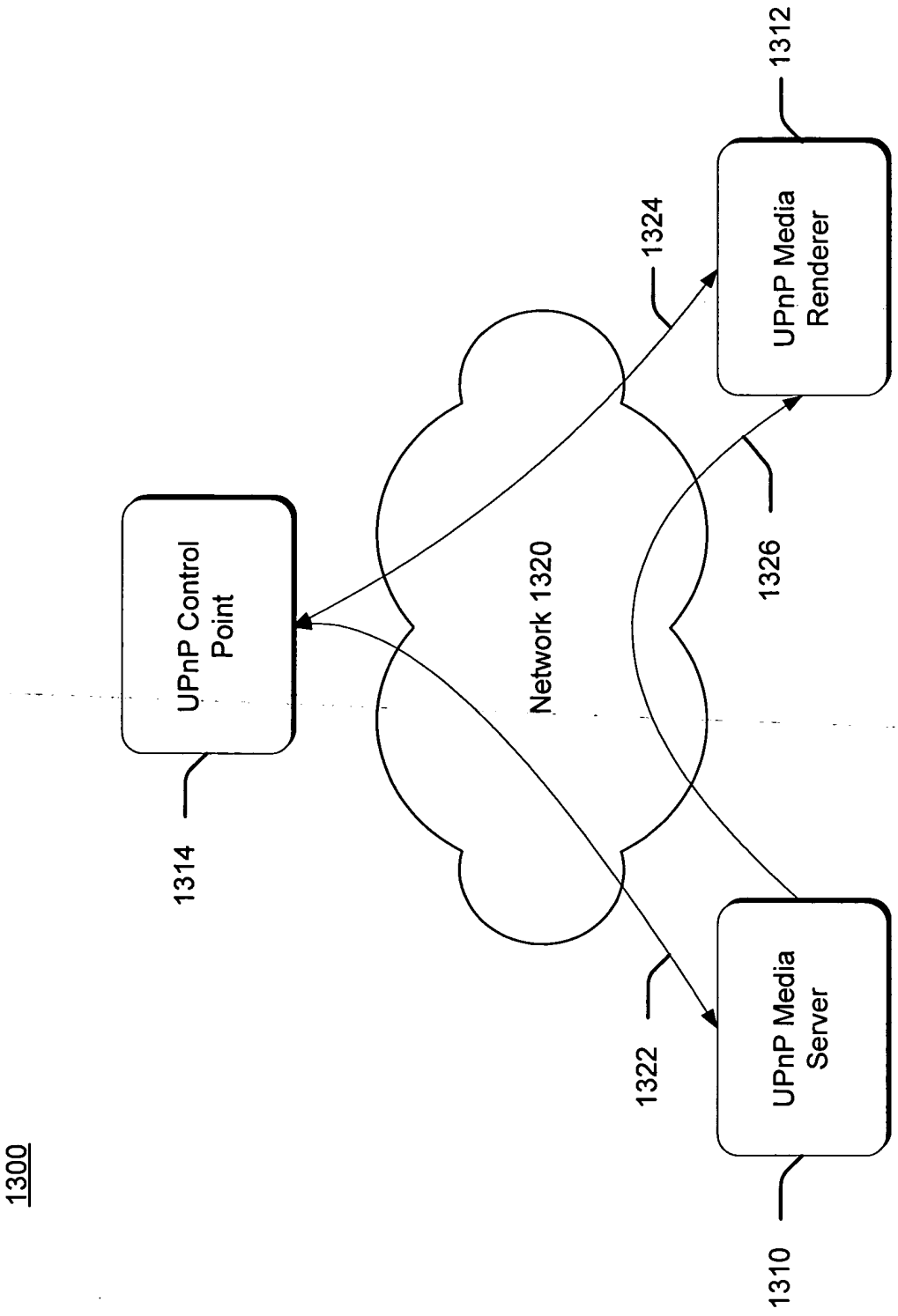
1300
UPnP Control Point
1314
Network 1320
1324
1326
UPnP Media Renderer
1312
1322
UPnP Media Server
1310

Fig. 13